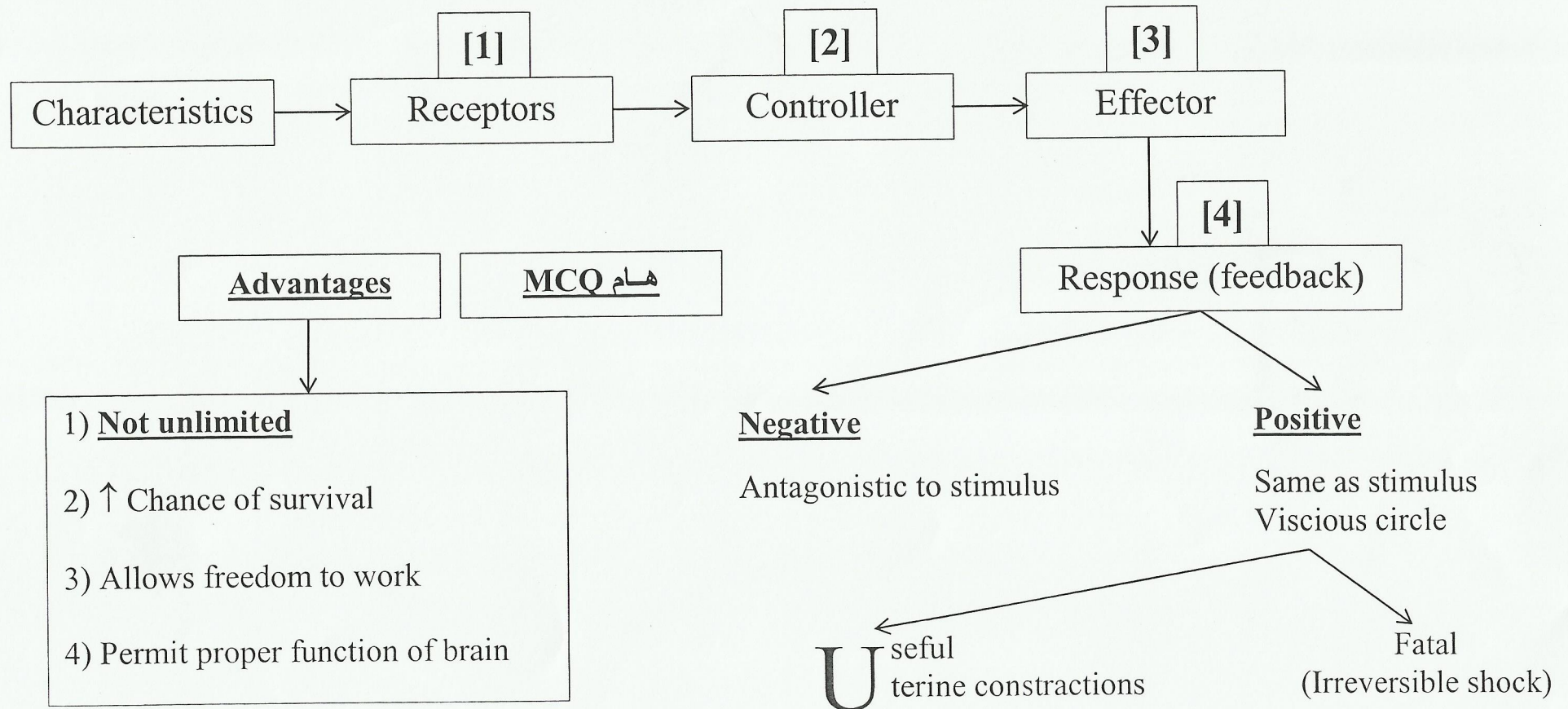


د. محمد فايز Homeostasis

Definition: Stability of internal environment

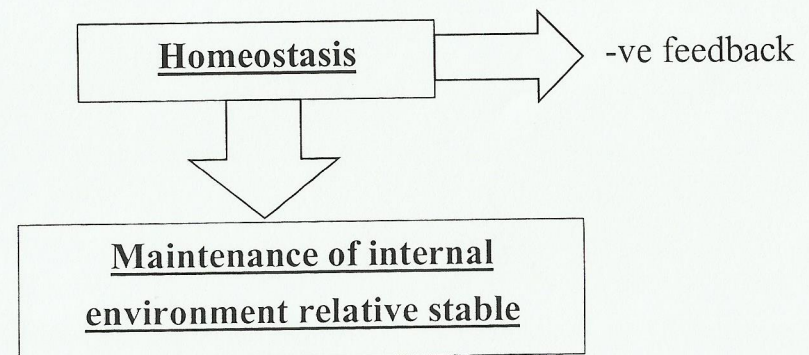
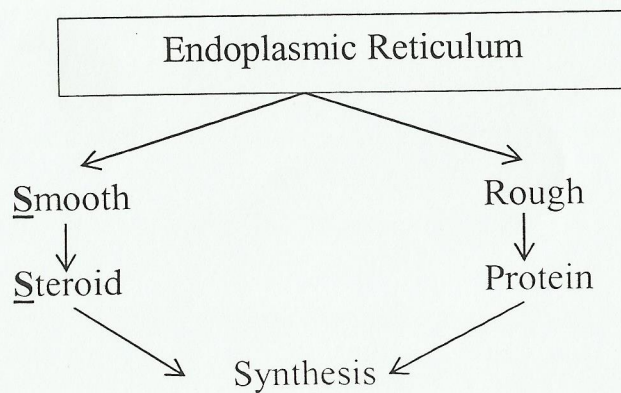


VISIT...

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د. محمد فايز

Carbohydrates	Lipid	Proteins
Receptors Blood group markers I identity markers I mmune reactions	Barrier (Selective) F ^{ence} F ^{uidity} — Membrane	Receptors C arriers ($\neq$ Pmps) C hannels (Ion) C ell adhesion molecules C atalyze chemical reactions



Total Body Water د. محمد فايز

Decreases with age

Weight of adult male 70 Kg

Females: Less (↑ fat)

60%

===
42 L

28 L

ICF

14 L

ECF

ISF: 10.5 L

Plasma: 3.5 L

Volume of Injected Substance

====
$$\frac{\text{Amount injected} - \text{Amount removed}}{\text{Concentration}}$$

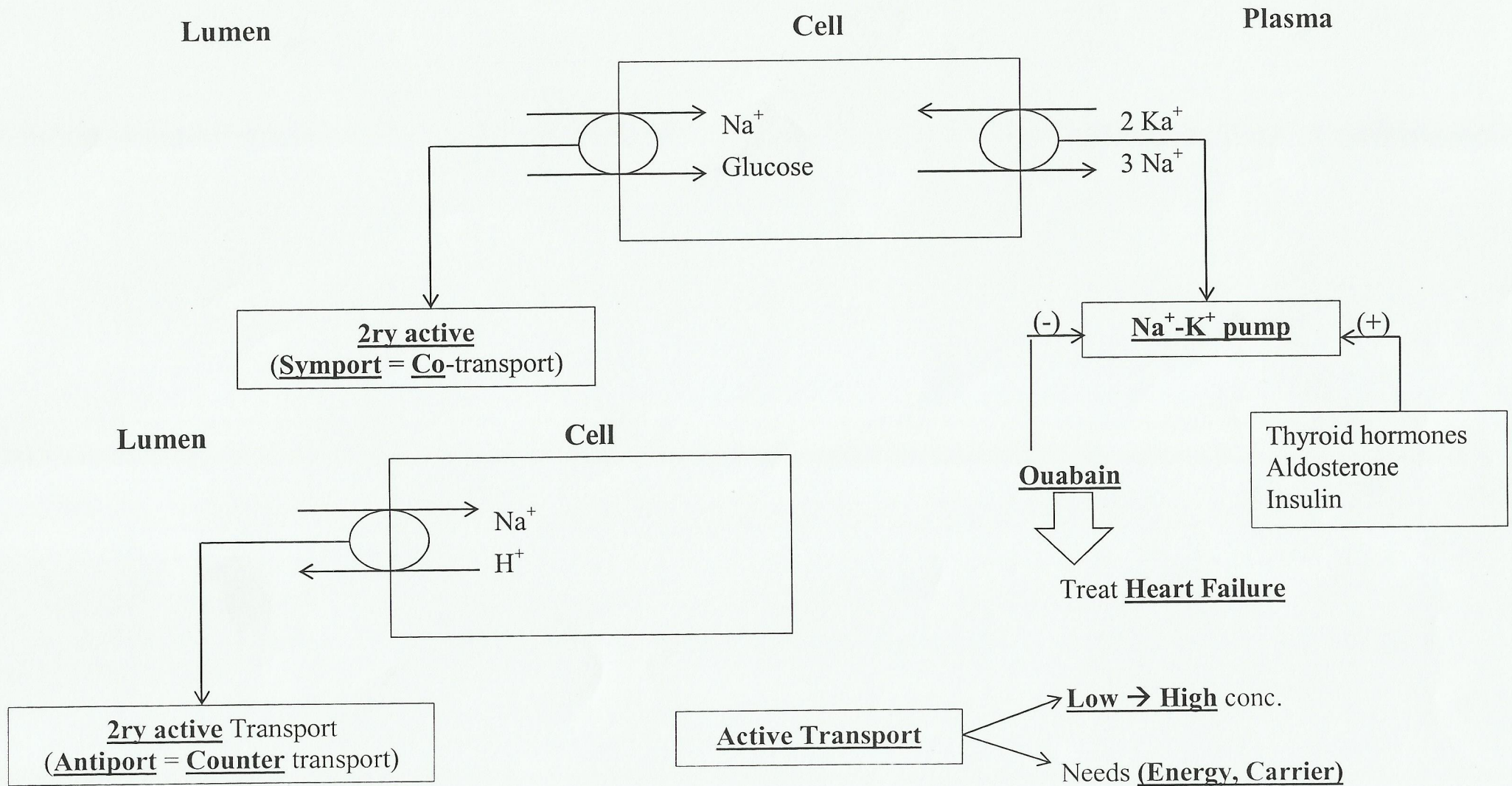
↑ ECF/ICF (Infant, Child)

More severe dehydration

Proteins ICF > Plasma > ISF

	TBW	ECF	Plasma	I_{SF}^{CF}
Measured by:	* Labeled water a) Deuterium oxide b) Tritium oxide * Aminopyrine	I nulin isotopes T hiosulphate thiocyanate Sucrose, Mannitol	Evans Blue Albumin labeled with ^{131}I	Not measured Directly

د. محمد فايز (تابع) Transport



د. محمد فايز Transport

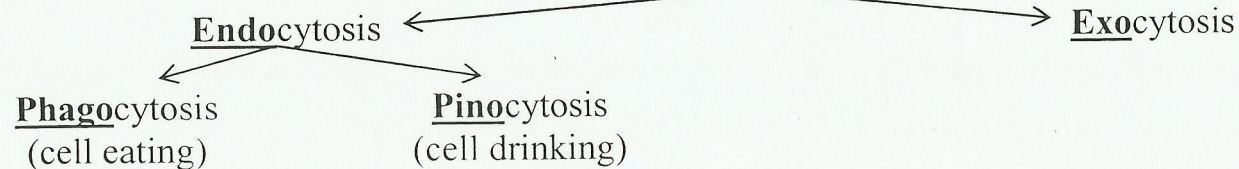
← Passive

Active →

	D i f f u s i o n	
	(Simple)	(Facilitated)
Characters	High → Low Conc. No Energy No carrier	
Example	<u>Lipid bilayer</u> O₂ ← CO₂ ← Glucose → Urea <u>Ion channels</u> Leakage ← Gated ← Ligand Voltage	Carrier Transport Max. Glucose

	Primary (1 ^{ry})	Secondary (2 ^{ry})
Characters	Energy provided from ATP hydrolysis	Uses energy of 1 ^{ry} active Na ⁺ to transfer مواد Vs conc. gradient
Example	1) <u>Na⁺-K⁺ pump</u> * Electrogenic * 3 Na ⁺ out: 2K ⁺ in * Importance: Maintain (RMP, cell volume) 2) <u>Ca⁺⁺ pump.</u> 3) <u>H⁺-K⁺ pump</u>	1) <u>Co transport</u> * Glucose * Amino acid 2) <u>Antiport</u> * Na ⁺ -Ca ⁺⁺ exchanger * Na ⁺ -H ⁺ exchanger

Macromolecules



د. محمد فايز Movement of Water

Water Diffusion
($\uparrow \text{H}_2\text{O} \rightarrow \downarrow \text{H}_2\text{O Conc.}$)
($\downarrow \text{Solute} \rightarrow \uparrow \text{Solute}$)

Osmosis

Prevented by osmotic pressure

Filtration

Water moves from
high $\rightarrow$ Low
hydrostatic press.

Fick's Law

Filtration rate

$$\Delta P \times S A \times \text{filtration coefficient}$$

Ultra filtration

Plasma - colloid

Solvent drage

Solvent takes some
molecules of solute

Small force

عندما يتحرك في اتجاه معين

Definitions

Mole

MW of substance (gram)

Equivalent

Mole (Ionized substance)/Valence

Osmole

Conc. of osmotic active particles

Osmolarity

Number of osmoles/Liter

Osmolality

Number of osmoles/Kg solvent

Plasma
 ~ 290 mosomol/L

Described by Tonicity

Tonic

Iso

Hyper

Hypo

Non Diffusible Ions (Proteins) د. محمد فايز

Before equilibrium		At equilibrium	
Side X	Side Y	Side X	Side Y
5 Na ⁺	10 Na ⁺	9 Na ⁺	6 Na ⁺
5 Protein ⁻	10 Cl ⁻	4 Cl ⁻	6 Cl ⁻
		5 Protein ⁻	

Gibbs Donnan Equilibrium

CONC

gradient equals, opposes electric gradient

product of Diffusible ions equal ($6 \times 6 = 9 \times 4$)

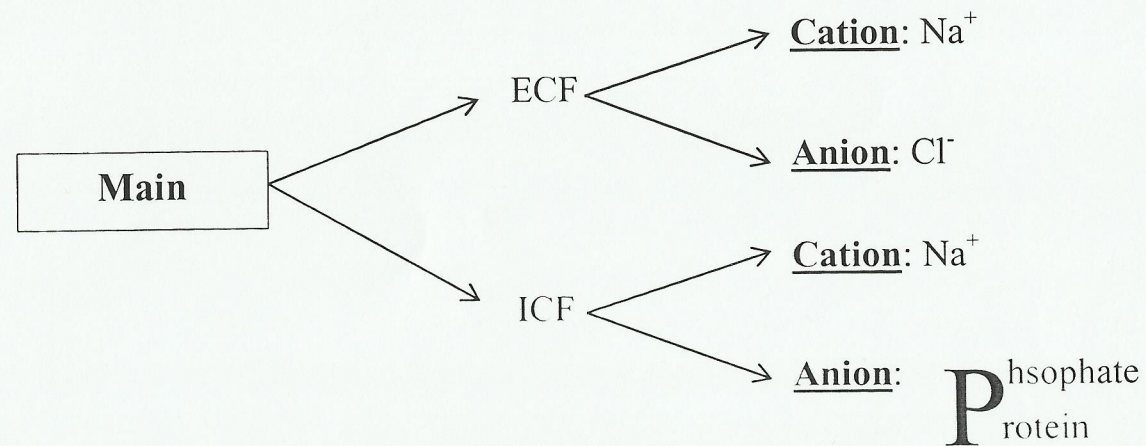
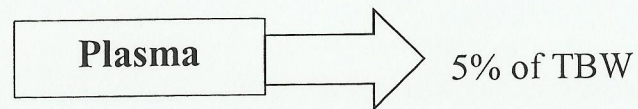
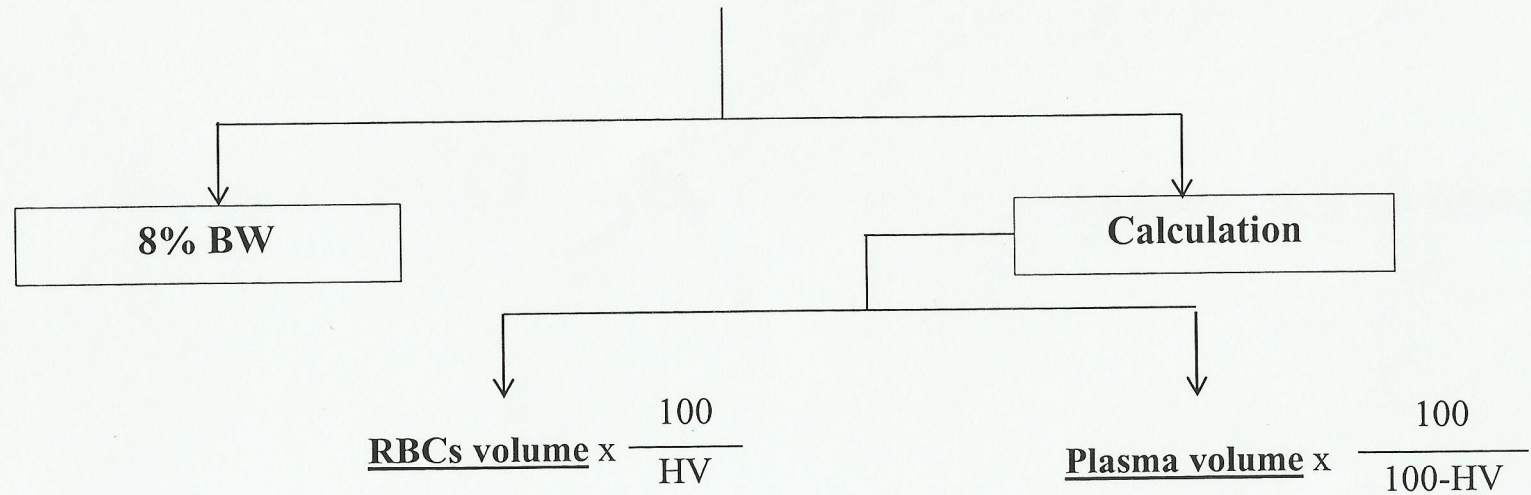
of Diffusible cation (Na⁺) greater in side X

Cationic charges = Anionic charges (Side X = Side Y)

Cl⁻ shift phenomena

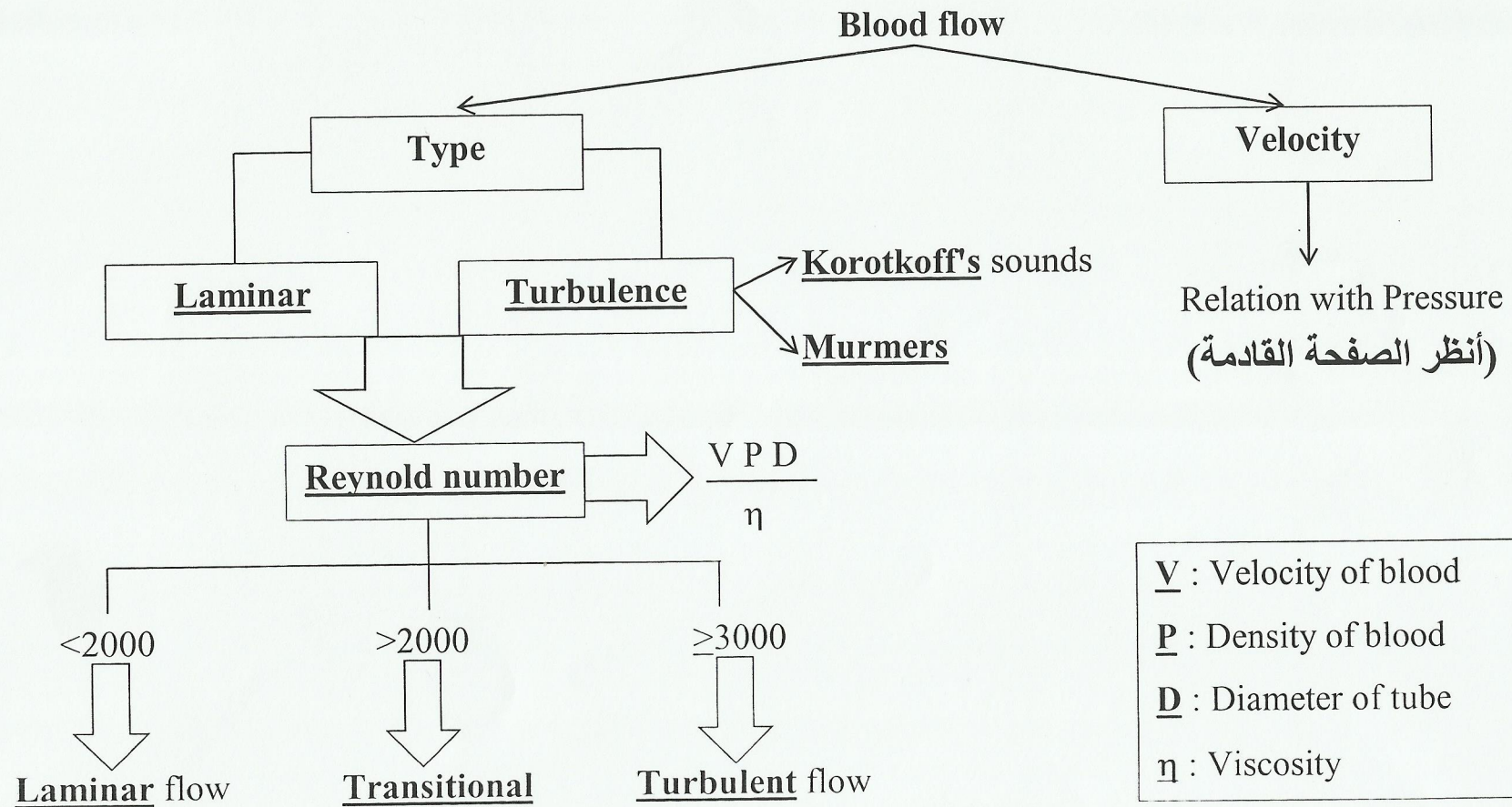
Fluid reabsorption

د. محمد فايز Blood Volume

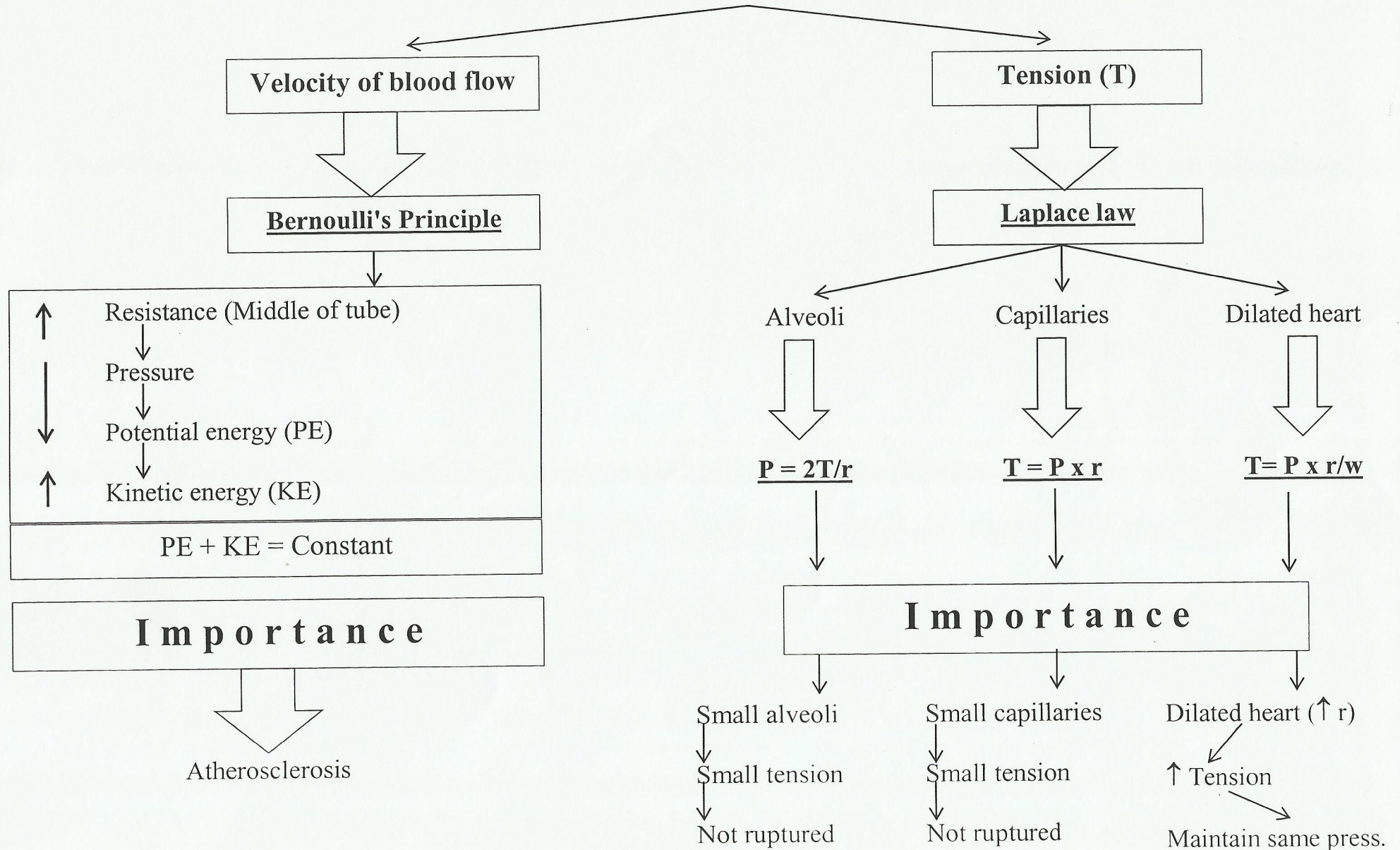


د. محمد فايز Physics Control Blood Flow

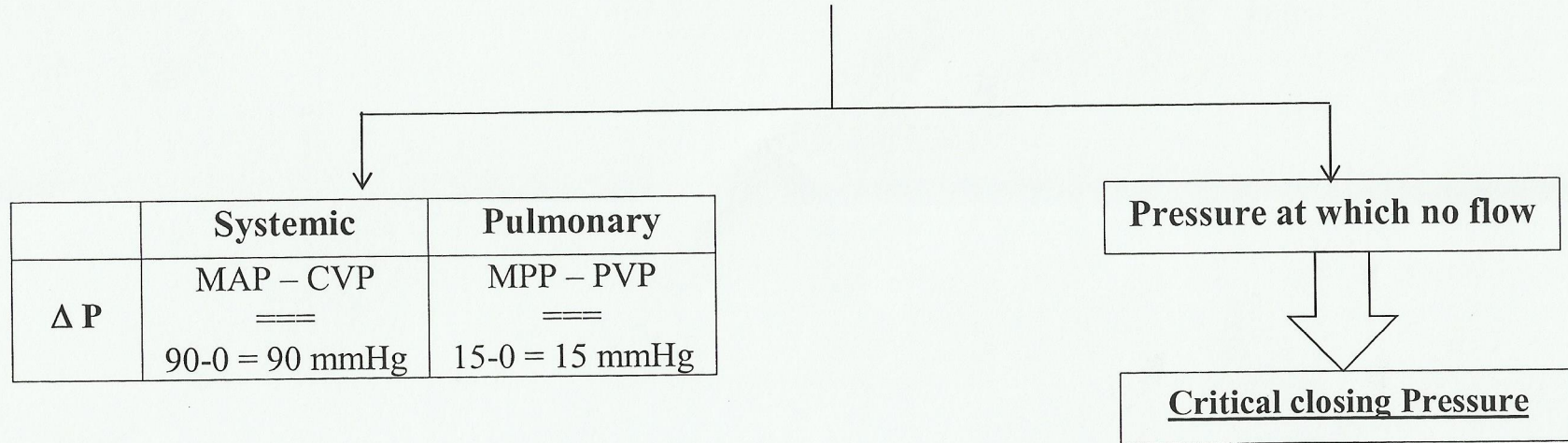
$$\text{Flow (F)} = \Delta P / \text{Resistance (R)}$$



د. محمد فايز Pressure relation with



د. محمد فايز Pressure, Resistance



Poiseuille's law $\rightarrow R = \frac{8 L \eta}{\pi r^4}$

R : Resistance
L : Length
 η : Viscosity
r : Radius

Length, viscosity (constant) while radius is variable

MCQ

If radius is doubled, resistance will decrease:

- a) 2 Times.
- b) 4 Times.
- c) 8 Times.
- ✓ d) 16 Times.